



Functionally Gradient Transition Joint for Dissimilar Metal Welding using Plasma Arc Lamps

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ABSTRACT:

The primary objectives of this research are to develop functional gradient transition joints between carbon steel and austenitic stainless steel for nuclear reactors. The research will directly address the needs described in development of advanced joining techniques for materials for nuclear fission reactor applications. This collaborative project between Mesocoat Inc and Oak Ridge National Laboratory capitalizes on recent advances made by each organization in the field of dissimilar metal joining and application of high-energy density plasma arc lamp processing. This research will use high density infrared generated by plasma arc lamp to build gradient transition joint for dissimilar metal welding. The task includes transition joint composition design, transition joint fabrication microstructure characterization, residual stress measurement and mechanical testing. The results of this research will provide: 1) Design approach and processing parameters for manufacturing gradient transition joints 2) Validation of controlled microstructure and composition in the gradient transition joint 3) Validation of reduction of residual stress and improved stress corrosion cracking resistance in gradient transition joint.